REVISED 7/02

LSUE COURSE SYLLABUS

I.	**Chemistry 2261**	**Instructor: Chemistry Faculty**

II.	**Course description from the current LSUE catalog:**

Organic Chemistry. Lec. 3; Cr. 3.
Representative classes of organic compounds; emphasis on varied professional goals of students, e.g., life sciences, physical sciences, engineering.
Prerequisite: Chemistry 1202.

III.	**Textbook(s) and other required materials:**

Organic Chemistry, 6th ed. by Morrison and Boyd, Allyn and Bacon, Prentice Hall, Inc.
Study Guide, 6th ed. by Morrison, Prentice Hall, Inc., is optional.
Molecular Model Set, 1984, Prentice Hall, Inc., is optional.

IV.	**Evaluation/grading (policy and basis; number and frequency of tests and papers; weights of particular tests or papers; etc.):**

Three one-hour tests-each worth 100 points-and a comprehensive 100-point final examination are given. Tests are written to a 10-point scale and grades are assigned on that basis. Additional graded components may also be assigned at the discretion of your instructor.
All tests aim at the application of knowledge. Test questions will include, among others: predicting physical and chemical properties, nomenclature, synthesis, mechanism, predicting products, interpreting analytical data, etc.

V.	**Policies pertaining to attendance, late work, make-up work, etc.:**

Students are encouraged to attend every lecture. Attendance for tests, which are announced at least a week in advance, is mandatory. If a student has a mitigating circumstance which absolutely prohibits him from being present for a test, he must get in touch with the instructor. If his excuse is acceptable and verified, his final grade will be assigned without that test.

VI.	**Course objectives:**

Students should:

Learn the type of thinking skills that are of particular value in predicting the synthesis of organic compounds.

Use critical thinking skills to solve organic word problems and apply theory within the scope of an introductory organic chemistry course.

Exhibit the proper understanding and use of organic vocabulary and nomenclature in discussing problems.

VII. Major instructional objectives:

Students should:

1. Understand how organic chemistry differs from inorganic chemistry and use hybrid orbitals to predict the shapes of molecules.

Use Lewis Electron Dot structures to predict the number of bonds between atoms in a molecule.

Understand how unshared electron pairs determine the shapes and properties of molecules.

Predict the polarity of molecules and show how this affects their physical properties.

Show how acid-base properties of molecules can be used to predict relative reactivity of a compound.

Write the mechanism for free radical substitution of methane.

Describe the shape of a methyl free radical in terms of hybridized orbitals, and account for the location of the unpaired electron.

Show an understanding of transition state and use the concept to predict energy changes and spatial changes during the course of a reaction on an energy diagram.

Classify, write formulas for, and name alkanes.

Show reactions that illustrate synthesis of alkanes.

Relate the ease of abstraction of hydrogen atoms to the ease of formation of free radicals.

Compare the transition state for bromination and chlorination and relate it to reactivity of free radicals.

2. Understand stereoisomers in terms of the chiral carbon.

Illustrate the concept of optical activity using a pair of enantiomers.

Assign configuration to chiral carbons in various enantiomers and diastereomers.

Relate configurations to reactions of chiral molecules.

3. Use the two mechanisms for nucleophilic aliphatic substitution and the two mechanisms for elimination to predict various products of these reactions.

Use inversion of configuration in an S_N2 reaction to predict the structure of the product.

Illustrate the shape of a carbocation and discuss how pairs of enantiomers can be formed in S_N2 reactions.

Compare S_N1 and S_N2 reactions with respect to reactivity in polar and nonpolar solvents, possibility of rearrangements, and inversion of configuration.

Compare the bond lengths, hybridized state and bond angles in alkanes and alkenes.

Contrast E_1 and E_2 mechanisms with regard to stereochemistry and the possibility of rearrangements.

Compare E_2 and S_N2 reactions with regard to the class of the substrate and the polarity of the solvent.

4. Discuss alkanes, alkenes, alkynes and alicyclic hydrocarbons with respect to their characteristic reactions.

Show the mechanisms for electrophilic and free radical additions to alkenes and alkynes.

Discuss Markovnikov's rule in terms of its historic and modern day statements.

Draw the structures of various organic compounds from their names.

Contrast the mechanisms of addition of bromine to alkenes in the presence of or absence of peroxides.

Show the mechanisms for addition of halogens to alkenes and alkynes

Discuss simple vs. degradation analysis of the structure of alkenes.

Discuss and show the mechanism for electrophilic addition to alkynes.

Show the usefulness of metal acetylides in the synthesis of alkynes.

Compare and contrast torsional strain with angle strain and steric strain in alicyclic hydrocarbons.

Locate axial and equitorial bonds in chair cyclohexane.

Discuss stereoisomers in terms of cyclic compounds.

5. Discuss alcohols, ethers, and alkyl halides with respect to their characteristic reactions and physical properties.

Show the mechanism for electrophilic dehydration of alcohols and diols to alkenes and alkynes.

Predict and analyze trends in physical properties such as boiling point.

Draw the structure of various organic compounds from their names.

Predict product orientation based on reactant stereoisomerism.

Write mechanisms for various eliminations, substitutions, and rearrangements.

Apply mechanistic considerations to the Williamson ether synthesis.

Use physical and chemical properties to interpret analytical data.

VIII. Brief summary of course content by major units of instruction:

1. Structure and Properties of Organic Molecules
2. Methane
    a. Energy of Activation
    b. Transition State
3. Alkanes and Free Radical Substitution
    a. Structure and Nomenclature of alkanes
    b. Classes of Carbons
    c. Mechanism and Orientation of halogenation
4. Optical Activity and Stereoisomerism
    a. Prediction of Enantiomerism; Chirality
    b. Specific Rotation and the Specification of Configuration
    c. Identifying Diastereomers and Meso Structures
    d. Reactions of Chiral Molecules

5. Alkyl Halides
    a. Structure and Preparation
    b. Mechanism & Nucleophilic Aliphatic Substitutions
    c. Carbocations and Their Relative Stabilities
    d. S_N1 vs. S_N2 Reactions
6. Alcohols and Ethers
    a. Structure and Preparation
    b. Nomenclature of Alcohols and Ethers
    c. Reactivity, Polarity, and Relative Acidity
    d. Elimination Reactions
7. Role of Solvent
    a. Solubility and Secondary Bonding
    b. Protic and Aprotic Solvents
    c. Solvent Effect on Substitution Reactions
8. Alkenes I
    a. Structure and Preparation
    b. Geometric Isomerism
    c. Alkene Nomenclature
    d. Physical Properties of Alkenes
    e. Elimination Reactions and Mechanisms
    f. Competitive Elimination: E1 vs E2
    g. Elimination vs Substitution
9. Alkenes II
    a. Reactions of Alkenes
    b. Addition Reactions
    c. Hydrogenation
    d. Electrophilic Reactions
    e. Free-Radical Addition Reactions
    f. Dimerization Reactions
    g. Cleavage Reactions, Ozonolysis
    h. Analysis of Alkenes
10. Stereochemistry II
    a. Stereoisomerism of Reaction Products
    b. Stereospecific Reactions
    c. *Syn* vs *anti* E2 Elimination
    d. Stereoselectivity vs Stereospecificity

IX. Methods of instruction:

Lectures and discussion of the material with students are used. Problem sessions are scheduled when needed. Online readings, exercises, practice quizzes, and drills will be made available on the MyCourses webpage for the course on an ongoing basis.

X. Brief overview of special instructions:

Students are encouraged to form study groups, to attend any extra problem sessions and office hours with the instructor, and to work with models. They are also referred to the Tutorial Center on campus when an organic chemistry tutor is available. Daily visits to and extensive utilization of the MyCourses webpage are very strongly advised, and may be required at the discretion of the instructor.

XI. Bibliography of supplemental references and/or source materials:

The Handbook of Chemistry & Physics. Chemical Rubber Co., Pub. 1990.
Additional items made available on the MyCourses webpage.

ADS Americans with Disabilities Act) Statement

Any student who is a "qualified individual with a disability" as defined by Section 504 of the Rehabilitation Act and Title II of the ADA, and who will need accommodated services (e.g., note takers, extended test time, audiotape, tutorials, etc.) for this course must register and request services through the Office of Academic Assistance Programs, S-150.

CSD CODE OF STUDENT CONDUCT

LSUE enforces discipline on campus to protect the academic environment of the campus and the health and safety of all members of the University community. To accomplish this objective, the University enforces standards of conduct for its students. Students who violate these standards can be denied membership in the LSUE community through imposition of disciplinary sanctions.

The LSUE Code of Student Conduct can be found on the LSUE website (lsue.edu). Follow the "Current Students" link from the homepage, and then click on "Student Handbook."